NORTHROP GRUMMAN

Electronic Systems

Global Hawk Air Force Production (UAV#7, Lot 1, 2)

Preliminary CIP Implementation Plans

Jan 20, 2003

Global Hawk Production Sensors

- **Planned for CIP Release 6.6**
  - **Release About July 2004**
- **Global Hawk Developing New IDDs**
  - **95% Same Info as Current IDD**
  - **Organized as External Interface Documents**
  - **NITF SDE Changing**
  - **Legacy Polar Format Spot Defined for First Time**
-

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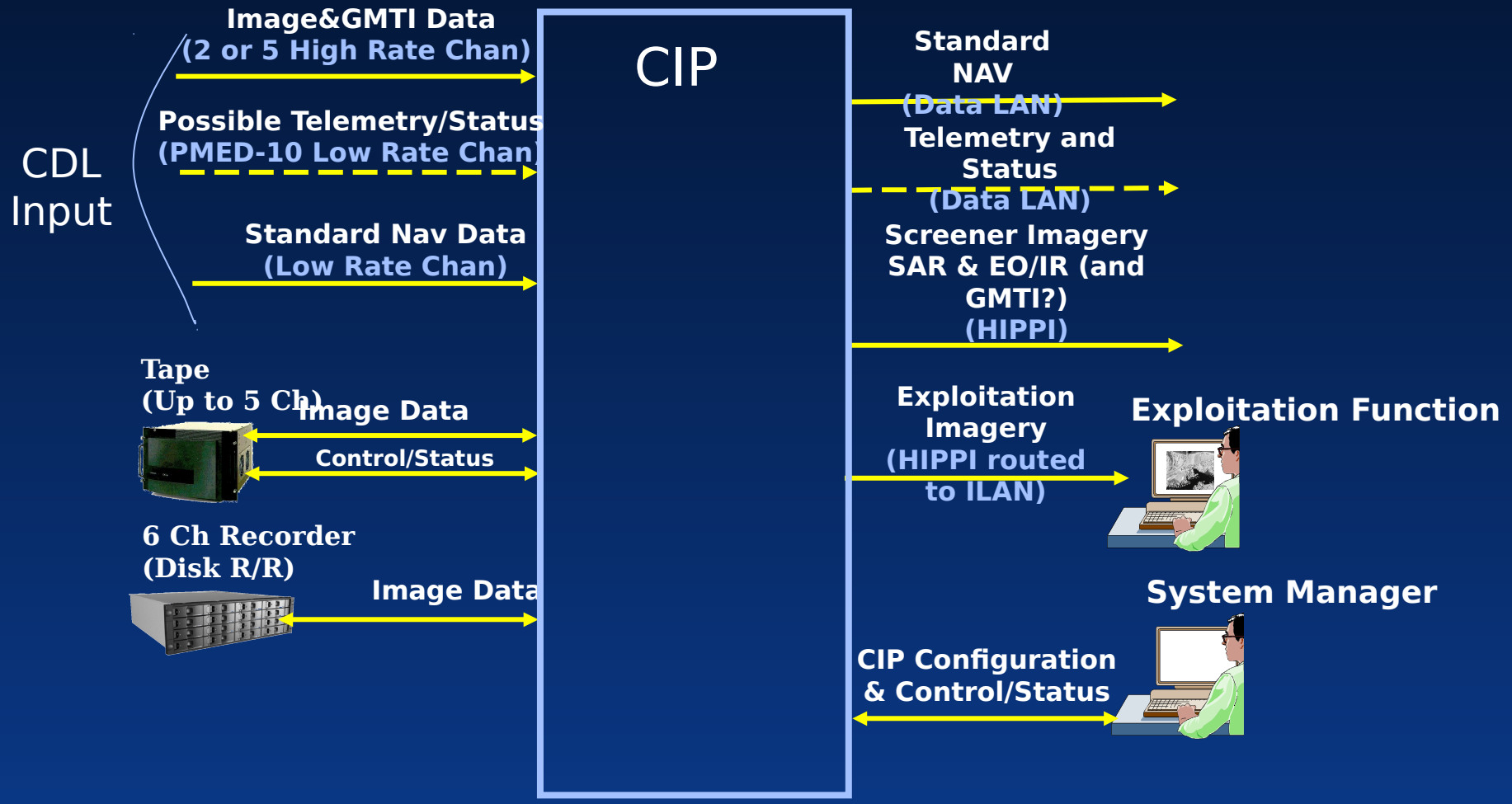
CIP Requirements for Production Sensors

- CIP Receives/Processes Sensor Data via CDL
  - EO/IR (Similar to ACTD)
  - SAR (Similar to AIP)
  - GMTI
  - All in NITF 2.1 format
- CIP Receives Standard Nav and (possibly) Downlink Status PMED-10 data via CDL
- CIP Receives/Processes Sensor Data FTP'ed from Global Hawk Ground Station (MCE)
- CIP Plays Back DCRsi Copy of UAV Recorder Data

CIP Context Diagram for GH Prod. Sensors



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Production EO/IR Modes

- **Same as GH ACTD**
  - **Except added SDE Tags: AIMIDB & SENSRA**
- **Modes for Both EO and IR**
  - **Spot**
  - **Point Target**
  - **Wide Area Search**

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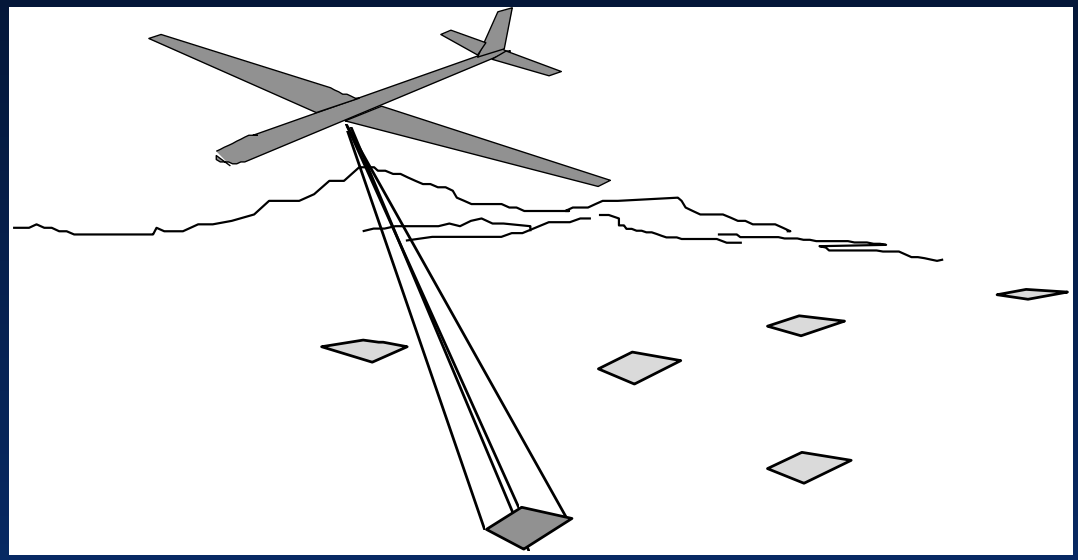
Global Hawk EO/IR

Spot Collection Mode

Single Band

Pixels:
EO: 8 Bits
IR: 12 Bits

Sensor Capability
Squint (Azimuth): +/- 15°
Roll (from Nadir): +/- 80°
Nominal Roll: +/- 60°



IDD Figure 6.2.3-1

Spot Sizes (Nominal)		
Video Type	**Cross-Track Size**	**Along-Track Size**
EO (Visible)	10 frames	14 swaths
MWIR	7 frames	14 swaths

Corresponds to 2 km X 2 km from 65,000 feet altitude, 45 degrees roll angle

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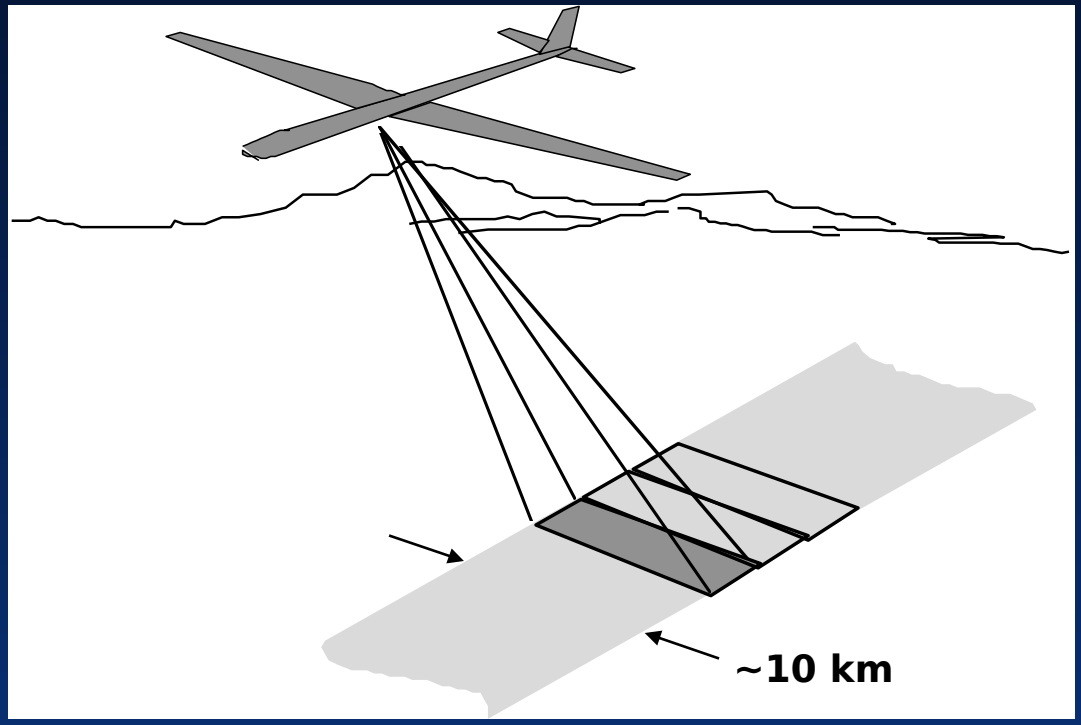
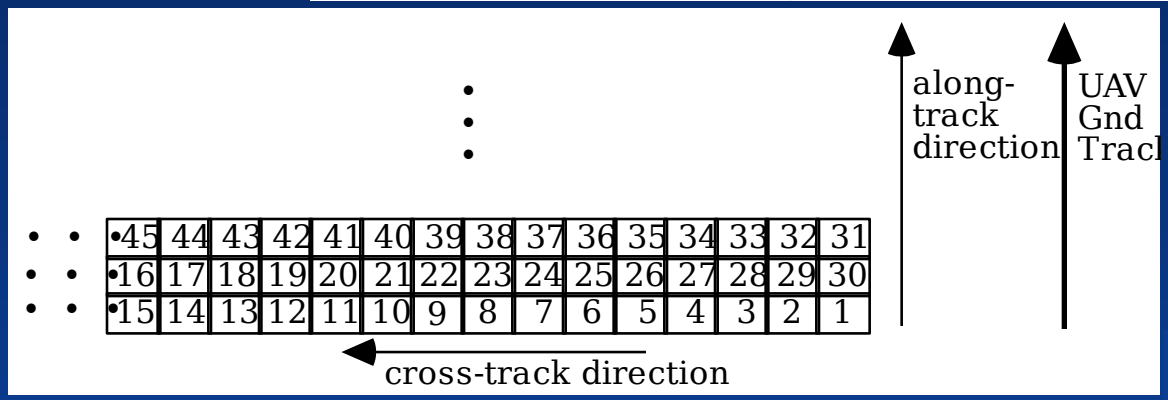
Global Hawk EO/IR

Wide Area Search Mode



IDD Figure 6.2.2-1



IDD Figure 6.2.2-2

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Production SAR Modes

- **SAR Production Modes (Based on ASARS-2A)**
  - **Point (Spot) mode**
  - **Search: Coarse, Medium, High Resolution Modes**
  - **All Use Range Migration Algorithm**
  - **All Outputs are Detected at Present**
- **SAR Temporary Spot Mode**
  - **Based on ACTD Spot (Polar Format Algorithm)**
  - **Detected Output Only**
- **GMTI**
  - **NITF File with One MTIRPB Tag**
  - **Up to 999 Hits per Tag**

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Global Hawk Radar Sensor

All SAR

Magnitude or Complex

8 Bit Pixels

Uncompressed or Compressed

20–200 Km Range

SAR STRIP

Continuous Collection Mode

10 km Wide Swath

Along Track or Canted

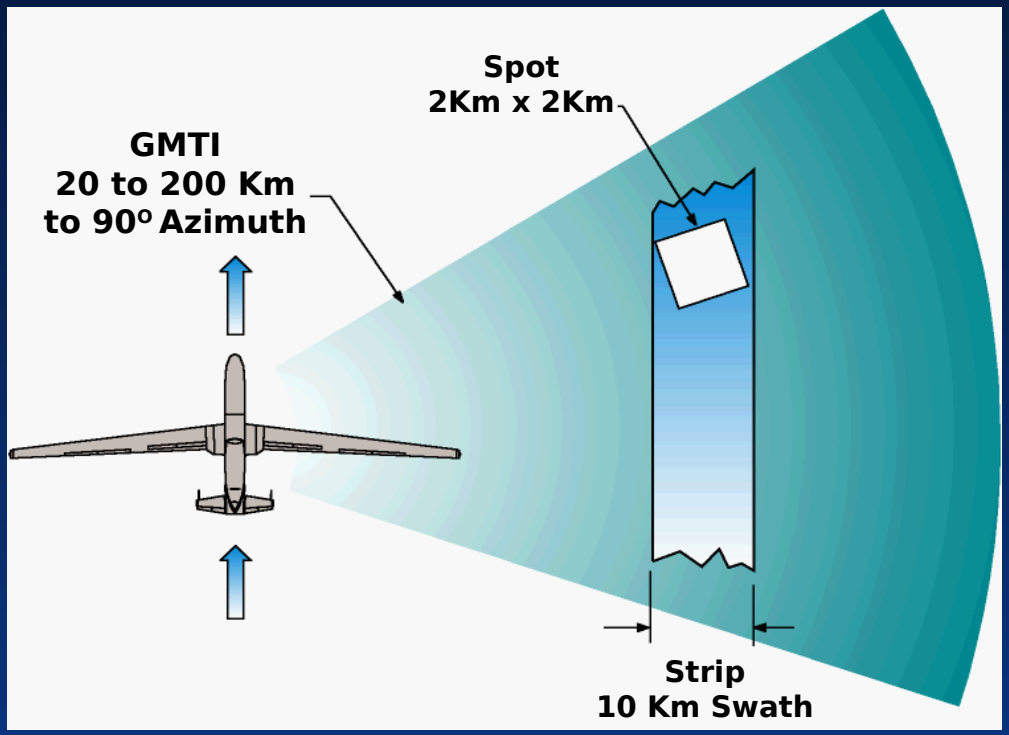
SAR Spot

2kmX2km (>50km range)

1kmX2km (20-50km range)

GMTI

Target Hits Only, No Imagery



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CIP Functions – Comms Narrow-Band

- Standard Nav Data as for ACTD
- Possible PMED-10 Status Implementation Completed
  - Definition becoming Available for All Receive Messages
  - Need in Question
  - Not Yet Activated on Downlink over CDL without C2 Uplink?

CIP Functions

- **EO/IR**
  - **Frame Uncompression**
  - **Frame Intensity Correction No Longer Needed**
  - **IR Optional Conversion from 12 to 8 bits**
  - **Mosaicing – see output products**
  - **Create Reduced Resolution Products**
- **GMTI Pass-through**
- **SAR**
  - **Tile JPEG Uncompression**
  - **Conversion from Complex to Detected Images**
  - **Mosaicing – see output products**
  - **Create Reduced Resolution Products**

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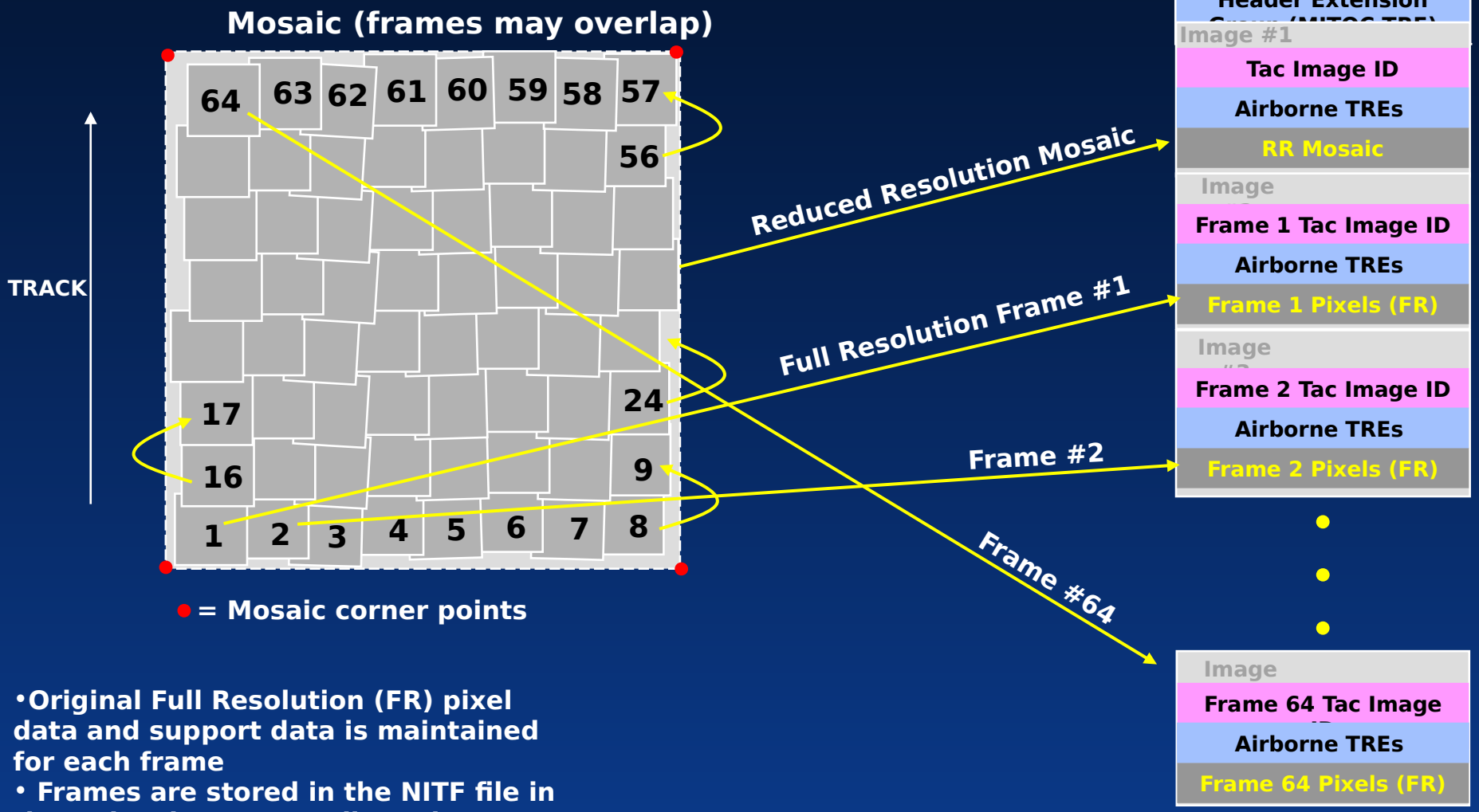
CIP Output Products - Preliminary

- EO/IR
  - Mosaic Options
    - NITF/MITOC Mosaic
      - Reduced Resolution (RR) Mosaic with Full Resolution Frames
    - or Full Resolution Mosaic
  - Frame Pass-Through Mode
- SAR
  - NITF/REGPT Mosaic
  - Tile Pass-Through Mode
- MTI Pass-Through
- Standard Navigation Data

CIP Output EO/IR MITOC Mosaic & NITF format



- Original Full Resolution (FR) pixel data and support data is maintained for each frame
- Frames are stored in the NITF file in the order they were collected

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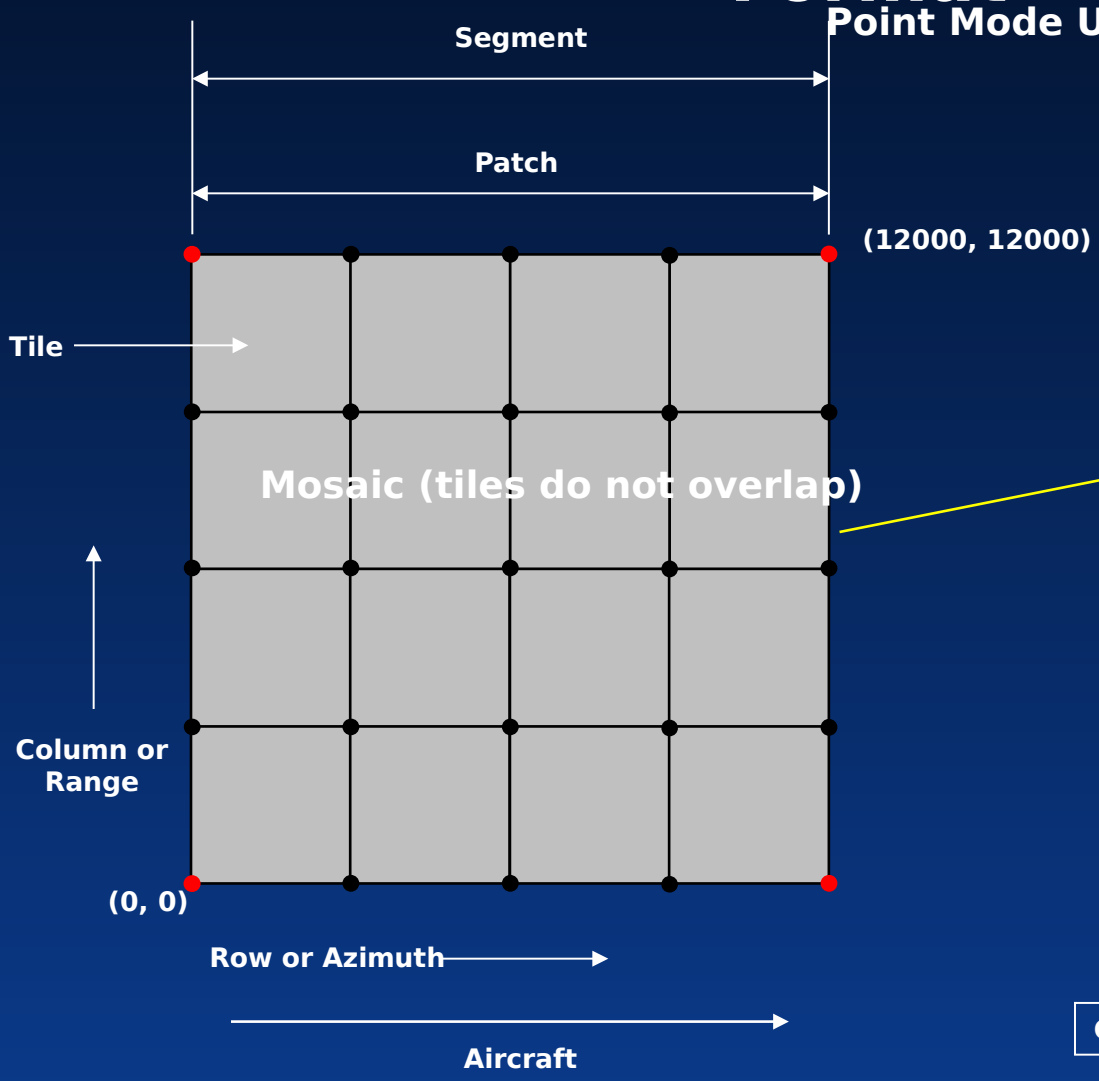
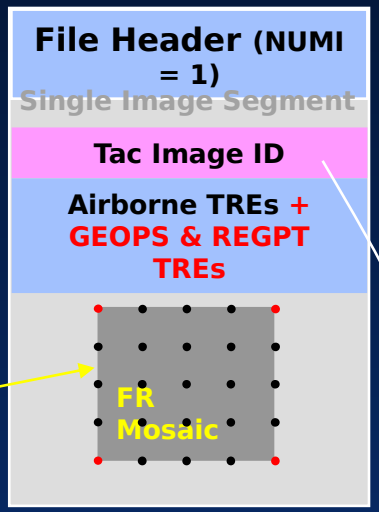
CIP Output SAR REGPT Mosaic & NITF Format

Point Mode Unsquinted



= Corner Points
= registration point in REGPT TRE



Tactical Image ID:
- Acquisition Date
- Program Code
- Sortie Number
- Image Operation Number
- Producer Code
- Product Number
- Project Code
- Replay
- Producer Serial Number
- Production Date/Time

GEOPS = geo positioning information extension

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